Santa Ynez River Valley Groundwater Basin

- Groundwater Basin Number: 3-15
- County: Santa Barbara
- Surface Area: 204,000 acres (319 square miles)

Basin Boundaries and Hydrology

The Santa Ynez River Valley Groundwater Basin is bounded by the Purisima Hills on the northwest, the San Rafael Mountains on the northeast, the Santa Ynez Mountains on the south, and the Pacific Ocean on the west. On the east and underlying the groundwater basin, the basin is bounded by consolidated nonwater-bearing rocks of Tertiary age (Wilson 1959). The Santa Ynez River, which rises in Juncal Canyon, follows a westward course for about 70 miles through the valley before flowing into the Pacific Ocean. Precipitation across the valley ranges from 15 to 21 inches, with an average of 17 inches.

Previous reports have divided the basin into five parts: Santa Ynez Uplands, Lompoc Plain, Lompoc Terrace, Lompoc Uplands, and the Buellton Uplands (e.g., SBCWA 1996; Stetson 1992; Miller 1976). For this report, the Lompoc Plain, Lompoc Terrace, and Lompoc Uplands are referred to as the western portion of the basin, the Santa Ynez Uplands as the eastern portion of the basin, and the Buellton Uplands as the central portion of the basin.

Hydrogeologic Information

Water Bearing Formations

Groundwater can be found in unconsolidated alluvial and terrace deposits, including the Orcutt Formation, and the Paso Robles and Careaga Formations. The thickness of water-bearing materials in the eastern portion of the basin averages about 1,000 feet with a maximum of about 3,000 feet (Stetson 1995). The maximum thickness of the western portion of the basin is more than 1,500 feet near the hinge of the Santa Rita syncline (Bright and others 1992). The average specific yield of water-bearing materials in the western portion of the basin is estimated at 12 percent (DWR 1999). The average specific yield forwater-bearing materials in the basin is estimated at 8 percent (La Freniere and French 1968).

Holocene Deposits. Holocene age alluvium consists of unconsolidated lenticular bodies of gravel, sand, silt, and clay. This alluvium reaches a maximum thickness of about 200 feet (Upson and Thomasson 1951; Wilson 1959). In the eastern portion of the basin, the specific yield of alluvium has been estimated at 8 percent (DWR 1998) and the average specific yield of the alluvium in the basin is estimated at 19 percent (Wilson 1959).

Pleistocene Deposits. Terrace deposits consist of gravel, sand, silt, and clay. These deposits may be of moderate permeability locally (Wilson 1959) and are estimated to reach a maximum thickness of 150 feet (Upson and Thomasson 1951). The Orcutt Formation, which may be regarded as a terrace deposit, consists of continental deposits of sand interbedded with coarse gravel and minor amounts of silt and clay in the upper parts of the unit (Woodring and Bramlette 1950). The Orcutt Formation occurs discontinuously in the western part of the basin (Upson and Thomasson 1951). Its greatest known thickness is about 200 feet in the central part of the basin (Hamlin 1985). In the eastern portion of the basin, the specific yield is estimated at 8 percent for terrace deposits (DWR 1998).

Paso Robles Formation. The Paso Robles Formation of late Pliocene to early Pleistocene age is characterized by fluviatile deposits of sand and gravel interbedded with silt and clay in discontinuous, lenticular bodies. This unit reaches 700 feet thick in the Santa Rita Valley and thins westward (Hamlin 1985). Wells completed in this unit yield from 200 to 1,000 gpm (Upson 1951). In the eastern portion of the basin, the specific yield is estimated at 7 percent in the Paso Robles Formation (DWR 1998).

Careaga Sand. The Pliocene age Careaga Formation consists of unconsolidated deposits of fine- to medium-grained, marine sand with some silt (Worts and Thomasson 1951). It ranges in thickness from 450 to 1,000 feet (Hamlin 1985). Wells completed in this unit yield as much as several hundred gallons per minute (La Freniere and French 1968).

Restrictive Structures

The Lompoc-Solvang fault, also called the Santa Ynez River fault, occurs along the southern perimeter of the western portion of the basin (DWR 1999; Hall 1977; Sylvester and Darrow 1979); however, it does not directly affect the flow of groundwater entering the basin from the Santa Ynez Mountains (DWR 1999).

Recharge Areas

Recharge in the basin is derived from infiltration of precipitation, stream flows, and percolation of irrigation water and wastewater effluent (Miller 1976).

Groundwater Level Trends

During 1935 through 1941, water levels rose and reached their highest level on record in 1941 (Wilson 1959). Between 1941 and 1945 water levels declined slightly or remained nearly the same, but declined drastically during 1945 through 1951 (Wilson 1959). Water levels declined about 1.8 feet between November 1967 and November 1968 (DWR 1975a). Water levels in the western part of the basin declined during 1941 to 1972 (Miller 1976).

Groundwater flow is dominantly towards the Santa Ynez River, then, from east to west parallel to it.

Groundwater Storage

Groundwater Storage Capacity. The total storage capacity of the Santa Ynez River Valley Groundwater Basin is estimated at 2,700,000 af (Bader 1969; DWR 1975a). Based on data in Miller (1976), the storage capacity for the western portion of the basin is estimated to be at least 784,000 af. The storage capacity of the central portion of the basin is more than the 1,400,000 af reported to be in storage by SBCWA (1999). The storage capacity of the eastern portion of the basin is about 10 million af (La Freniere and French 1968). The storage capacity of the alluvial deposits in the basin is estimated at 105,000 af (Stetson 1992).

Groundwater in Storage. The amount of groundwater in storage in the western portion of the basin was estimated by Miller (1976) have been about 720,000 af, and the available water in storage (available for use without detrimental effects) was estimated to be 170,000 af by SBCWA (1999). The groundwater in storage in the central portion of the basin is estimated to be about 1,400,000 af (SBCWA 1996; 1999) with an available water in storage of about 154,000 af. The available water in storage in the eastern portion of the basin is estimated at 900,000 af (SBCPDC 1994, SBCWA 1999).

Groundwater Budget (Type A)

In the eastern portion of the basin, recharge from precipitation has been estimated to be 2,000 af/yr (Upson and Thomasson 1951), 3,500 af/yr (Evenson and Worts 1966), and 4,000 af/yr (Miller 1976). Recharge to the eastern portion of the basin from stream seepage has been estimated to be 2,200 af/yr (Upson and Thomasson 1951; Wilson 1959) and 7,600 af/yr (Evenson and Worts 1966). Estimated groundwater inflow or recharge to the eastern portion was estimated at 70,000 af/yr from infiltration of rain, 29,000 af/yr from irrigation-return water, and about 59,000 af/yr from seepage losses in streams (La Freniere and French 1968). Estimated pumping in the eastern portion of the basin is 14,100 af/yr, including about 12,100 af/yr of agricultural extractions (SBCWA 1996). Municipal and industrial pumpage is estimated at 1,720 af, and agricultural extraction at 10,370 af for the eastern portion of the basin in 1989 (Stetson 1992).

In the central portion of the basin, municipal and industrial pumpage was estimated at 384 af, and agricultural pumpage at 2,200 af in 1989 (SBCWA 1996).
In the western portion of the basin, average natural recharge is estimated at about 14,000 af/yr (Miller 1976). For the western portion of the basin, municipal and industrial pumpage is estimated to have been 5,450 af and agricultural pumpage 17,590 af for 1989 (Stetson 1992); total extractions are estimated at 22,459 af/yr (SBCWA 2001).

For the Santa Ynez River Valley Groundwater Basin, the average consumptive use of water by native vegetation and evaporation from bare soil during 1945 to 1951 is estimated at 7,100 af/yr (Wilson 1959). The average inflow from natural recharge is estimated at about 24,000 af/yr (Wilson 1959), and about 20 percent of the pumped irrigation water is estimated to return to the groundwater reservoir (Upson and Thomasson 1951), about 3,000 af/yr (Wilson 1959). Municipal and industrial pumpage from the basin is estimated at about 8,190 af/yr and agricultural extraction at about 22,900 af/yr (Cosby 1991).

Groundwater Quality

Characterization. Analyses of groundwater from 207 wells in this basin taken from 1930 through 1994 show TDS content ranging from 206 to 13,384 mg/L. In 1970, TDS concentrations ranged from 400 to 700 mg/L in the eastern portion of the basin (SBCWA 1996). The range in TDS content for the central portion of the basin has been reported as 300 to 700 mg/L (SBCWA 1996) and 450 to 770 mg/L (Stetson 1992). The TDS content for the western portion of the basin ranges from 400 to 8,240 mg/L with an average of 600 mg/L (Miller 1976; Stetson 1992). Samples analyzed in 1992 by USGS from the eastern portion of the basin indicate an average TDS concentration of 507 mg/L (SBCWA 2001). Water from 43 public supply wells has an average TDS content of 770 mg/L in the basin with a range of 328 to 1,828 mg/L.

Impairments. Water wells sampled in the western portion of the Santa Ynez River Valley Groundwater Basin indicate chloride concentrations range from to 2,050 mg/L. TDS concentrations ranging to 8,000 mg/L were measured in the late 1980s near the coast in the western part of the basin (Bright and others 1992). TDS concentrations averaging more than 2,000 mg/L were found in the western portion of the basin near the City of Lompoc (SBCWA 1996). Groundwater quality degraded significantly between 1972 and 1983 in the western part of the basin (Berenbrock 1988). Degraded groundwater beneath the coastal part of the valley containing chloride concentrations from 250 to 500 mg/L was found in 1955 (DWR 1975a).

Water Quality in Public Supply Wells

Constituent Group[1]	Number of wells sampled[2]	Number of wells with a concentration above an MCL[3]
Inorganics – Primary	49	0
Radiological	51	0
Nitrates	58	4
Pesticides	52	0
VOCs and SVOCs	51	0
Inorganics – Secondary	49	25

[1] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater – Bulletin 118* by DWR (2003).
[2] Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.
[3] Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Well Production characteristics

	Well yields (gal/min)	
Municipal/Irrigation	Range: to 1,300	Average: 750 (Bader 1969; DWR 1975b)
	Total depths (ft)	
Domestic		
Municipal/Irrigation		

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
USGS	Groundwater levels	163
USGS	Miscellaneous water quality	21
Department of Health Services and cooperators	Title 22 water quality	76

Basin Management

Groundwater management:

Water agencies

Public	City of Buellton, City of Lompoc, City of Solvang, Mission Hills CSD, Vandenberg Village CSD, Santa Ynez River WCD
Private	

References Cited

Bader, J. S. 1969. *Ground-water Data as of 1967, Central Coast Subregion, California.* U. S. Department of the Interior Geological Survey, Water Resources Division, Open-File Report.

Berenbrock, C. 1988. *Ground-Water Quality in the Lompoc Plain, Santa Barbara County, California, 1983.* U. S. Geological Survey Water-Resources Investigations Report 87-4101.

Bright, D. J., C. L. Stamos, P. Martin, and D. B. Nash. 1992. *Ground-Water Hydrology and Quality in the Lompoc Area, Santa Barbara County, California, 1987-88.* U. S. Geological Survey Water Resources Report 91-4172. Quoted in Santa Barbara County. *Santa Barbara County 1996 Groundwater Resources Report*. (Santa Barbara, California. 1996)

California Department of Water Resources (DWR). 1975a. *Sea-Water Intrusion in California: Inventory of Coastal Ground Water Basins*. Bulletin 63-5. 394 p.

______. 1975b. *California's Ground Water*. Bulletin 118.

______. 1998. *Evaluation of Groundwater Overdraft in the Southern Central Coast Region.* Technical Information Record SD-98-1, 13 p.

______. 1999. *Evaluation of Groundwater Overdraft in the Southern Central Coast Region, Part 2.* Technical Information Record SD-99-2, 116 p.

Cosby, P. G. 1991. *Santa Barbara County Growth Inducement Potential of State Water Importation*. Santa Barbara County Water Agency.

Evenson, R. E., and G. F. Worts. 1966. *Hydrologic Inventory of the Lompoc subarea, Santa Ynez River Basin, Santa Barbara County, California, 1957-62.* U.S. Department of the Interior, Geological Survey, Water Resources Division. 27 p.

Hall, C. A. 1977. *Origin and Development of the Lompoc-Santa Maria Pull-Apart Basin and its Relationship to the San Simeon-Hosgri Fault, California: Geological Society of America.* Quoted in DWR (1999). *Evaluation of Groundwater Overdraft in the Southern Central Coast Region, Part 2.*

Hamlin, S. N. 1985. *Ground-Water Quality in the Santa Rita, Buellton, and Los Olivos Hydrologic Subareas of the Santa Ynez River basin, Santa Barbara County, California.* U.S. Geological Survey Water-Resources Investigations Report 84-4131.

La Freniere, G. F., and J. J. French. 1968. *Ground-Water Resources of the Santa Ynez Upland Ground-Water Basin, Santa Barbara County, California.* U. S. Geological Survey Open-File Report. 42 p.

Miller, G. A. 1976. *Ground-Water Resources in the Lompoc Area, Santa Barbara County.* U. S. Geological Survey Open-File Report 76-183.

Santa Barbara County Planning and Development Department (SBCPDC). 1994. *Santa Barbara County Comprehensive Plan.* 77 p.

Santa Barbara County Water Agency (SBCWA). 1996. *Santa Barbara County 1996 Groundwater Resources Report.* 47 p.

______. 1999. *1999 Santa Barbara County Groundwater Report.* 63 p.

______. 2001. *2000 Santa Barbara County Groundwater Report.* 51 p.

Sylvester A.G., and Darrow, A. C. 1979. *Structure and Neotectonics of the Western Santa Ynez Fault System in Southern California: in Tectonics, vol. 52. Elsevier Scientific Publishing Company, Amsterdam, The Netherlands, pp. 389-405.* Quoted in DWR (1999). *Evaluation of Groundwater Overdraft in the Southern Central Coast Region, Part 2*

Stetson Engineers, Inc. 1992. *Santa Ynez River Water Conservation District Water Resources Management Planning Process, Phase I: Baseline Data and Background Information.* San Rafael, California.

______. 1995. *Seventeenth Annual Engineering and Survey Report on Water Supply Conditions of the Santa Ynez River Water Conservation District, 1994-98.* San Rafael, California. Quoted in Santa Barbara County. *Santa Barbara County 1996 Groundwater Resources Report*. (Santa Barbara, California. 1996).

Upson, J. E., and H. G. Thomasson, Jr. 1951. *Geology and Water Resources of the Santa Ynez River Basin, Santa Barbara County, California.* U. S. Geological Survey Water-Supply Paper 1107.

Wilson, H. D., Jr. 1959. *Ground-Water Appraisal of Santa Ynez River Basin, Santa Barbara County, California, 1945-52.* U. S. Geological Survey Water-Supply Paper 1467.

Woodring W. P., and M. N. Bramlette. 1950. *Geology and Paleontology of the Santa Maria District California.* U. S. Geological Survey Professional Paper 222.

Worts, G. F. Jr., and H. G. Thomasson, Jr. 1951. *Geology and Ground-Water Resources of the Santa Maria Valley Area, California*. U. S. Geological Survey Water-Supply Paper 1000.

Additional References

California Central Coastal Regional Water Quality Control Board. 1969. *Water Quality Control Policy for Santa Ynez River Basin and Underlying Ground Waters: Preliminary, First Draft.* 34 p.

Evenson, R. E. 1964. *Suitability of Irrigation Water and Changes in Ground-Water Quality in the Lompoc Subarea of the Santa Ynez River Basin, Santa Barbara County, California.* U.S. Dept. of the Interior, Geological Survey, Ground Water Branch, Open-file Report. 57 p.

Nelson, R. N., 1925. *Geology of the Hydrographic Basin of the Upper Santa Ynez River, California.* Berkeley, California: University of California Publications. Bulletin of the Department of Geological Sciences; v. 15, no. 10.

Richardson, H. E., and others. 1968. Lompoc Project, Feasibility Study, Ground-Water Geology and Resources Appendix. U. S. Bureau of Reclamation.

Spencer, C. H. 1955. *Santa Ynez River Basin, California: A Reconnaissance Study of the Water Problems of Southern Santa Barbara County.* Sacramento: United States Department of the Interior, Bureau of Reclamation.

Stetson Engineers, Inc. 1995. Seventeenth Annual Engineering and Survey Report on Water Supply Conditions of the Santa Ynez River Water Conservation District 1994-95. San Rafael, California.

United States Bureau of Reclamation. 1971. *Water Rights in the Santa Ynez River Basin.* Sacramento, California.

Warner, J. W. 1971. Ground Water in Santa Barbara and Southern San Luis Obispo Counties, California, Spring 1968 to Spring 1969. U. S. Geological Survey Open-File Report.

Wasserman, C. B. 1979. Final Report: Update on Lompoc Groundwater Basin, Elements of Recharge. Santa Barbara County Water Agency.

Errata

Changes made to the basin description will be noted here.